

THAT WHICH IS CLAIMED:

1. An isolated nucleic acid molecule selected from the group consisting of:
 - a) a nucleic acid molecule comprising the nucleotide sequence of SEQ ID NO:1, 2, 4, 5, 7, 9; 10, 18, or 20;
 - 5 b) a nucleic acid molecule comprising a nucleotide sequence having at least 90% sequence identity to the nucleotide sequence of SEQ ID NO:1, 2, 4, 5, 7, 9, 10, 18, or 20, wherein said nucleotide sequence encodes a polypeptide having glyphosate resistance activity;
 - c) a nucleic acid molecule which encodes a polypeptide comprising
- 10 the amino acid sequence of SEQ ID NO:3, 6, 8, 11, 19, or 21;
- 15 d) a nucleic acid molecule comprising a nucleotide sequence encoding a polypeptide having at least 90% amino acid sequence identity to the amino acid sequence of SEQ ID NO:3, 6, 8, 11, 19, or 21, wherein said polypeptide has glyphosate resistance activity; and,
- e) a complement of any of a)-d).

2. An isolated nucleic acid molecule of claim 1, wherein said nucleotide sequence is a synthetic sequence that has been designed for expression in a plant.

- 20 3. The nucleic acid molecule of claim 2, wherein said synthetic sequence has an increased GC content.

4. A vector comprising the nucleic acid molecule of claim 1.

- 25 5. The vector of claim 4, further comprising a nucleic acid molecule encoding a heterologous polypeptide.

6. A host cell that contains the vector of claim 4.

- 30 7. The host cell of claim 6 that is a bacterial host cell.

8. The host cell of claim 6 that is a plant cell.
9. A transgenic plant comprising the host cell of claim 8.

5 10. The plant of claim 9, wherein said plant is selected from the group consisting of maize, sorghum, wheat, sunflower, tomato, crucifers, peppers, potato, cotton, rice, soybean, sugarbeet, sugarcane, tobacco, barley, and oilseed rape.

10 11. Transgenic seed of a plant of claim 9.

15 12. An isolated polypeptide selected from the group consisting of:

- a) a polypeptide comprising the amino acid sequence of SEQ NO:3, 6, 8, 11, 19, or 21;
- b) a polypeptide encoded by the nucleotide sequence of SEQ ID NO:1, 2, 4, 5, 7, 9, 10, 18, or 20;
- c) a polypeptide comprising an amino acid sequence having at least 90% sequence identity to the amino acid sequence of SEQ ID NO:3, 6, 8, 11, 19, or 21, wherein said polypeptide has glyphosate resistance activity; and,
- d) a polypeptide that is encoded by a nucleotide sequence that is at least 90% identical to the nucleotide sequence of SEQ ID NO:1, 2, 4, 5, 7, 9, 10, 18, or 20, wherein said polypeptide has glyphosate resistance activity.

20 13. The polypeptide of claim 12 further comprising a heterologous amino acid sequence.

25 14. A method for producing a polypeptide with glyphosate resistance activity, comprising culturing the host cell of claim 6 under conditions in which a nucleic acid molecule encoding the polypeptide is expressed, said polypeptide being selected from the group consisting of:

- a) a polypeptide comprising the amino acid sequence of SEQ ID NO:3, 6, 8, 11, 19, or 21;

b) a polypeptide encoded by the nucleic acid sequence of SEQ ID NO:1, 2, 4, 5, 7, 9, 10, 18, or 20;

c) a polypeptide comprising an amino acid sequence having at least 90% sequence identity to a polypeptide with the amino acid sequence of SEQ ID NO:3, 6, 8, 11, 19, or 21, wherein said polypeptide has glyphosate resistance activity; and,

5 d) a polypeptide encoded by a nucleic acid molecule comprising a nucleotide sequence having at least 90% sequence identity to the nucleic acid sequence of SEQ ID NO:1, 2, 4, 5, 7, 9, 10, 18, or 20, wherein said polypeptide has glyphosate resistance activity.

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15. A method for conferring resistance to glyphosate in a plant, said method comprising transforming said plant with a DNA construct, said construct comprising a promoter that drives expression in a plant cell operably linked with a nucleotide sequence at least 90% identical to the nucleotide sequence of SEQ ID NO:3, 6, 8, 11, 19, or 21, and
15 regenerating a transformed plant.

16. A plant having stably incorporated into its genome a DNA construct comprising a nucleotide sequence that encodes a protein having glyphosate resistance activity, wherein said nucleotide sequence is selected from the group consisting of:

20 a) a nucleotide sequence of SEQ ID NO:1, 2, 4, 5, 7, 9, 10, 18, or 20;

b) a nucleotide sequence having at least 90% sequence identity to a nucleotide sequence of SEQ ID NO:1, 2, 4, 5, 7, 9, 10, 18, or 20, wherein said nucleotide sequence encodes a polypeptide having glyphosate resistance activity;

c) a nucleotide sequence encoding a polypeptide comprising an
25 amino acid sequence of SEQ ID NO:3, 6, 8, 11, 19, or 21; and,

d) a nucleotide sequence encoding a polypeptide having at least 90% amino acid sequence identity to the amino acid sequence of SEQ ID NO:3, 6, 8, 11, 19, or 21, wherein said polypeptide has glyphosate resistance activity;
wherein said nucleotide sequence is operably linked to a promoter that drives expression
30 of a coding sequence in a plant cell.

17. A plant cell having stably incorporated into its genome a DNA construct comprising a nucleotide sequence that encodes a protein having herbicide resistance activity, wherein said nucleotide sequence is selected from the group consisting of:

- a) a nucleotide sequence of SEQ ID NO:1, 2, 4, 5, 7, 9, 10, 18, or 20;
- 5 b) a nucleotide sequence having at least 90% sequence identity to a nucleotide sequence of SEQ ID NO:1, 2, 4, 5, 7, 9, 10, 18, or 20, wherein said nucleotide sequence encodes a polypeptide having glyphosate resistance activity;
- c) a nucleotide sequence encoding a polypeptide comprising an amino acid sequence of SEQ ID NO:3, 6, 8, 11, 19, or 21; and,
- 10 d) a nucleotide sequence encoding a polypeptide having at least 90% amino acid sequence identity to the amino acid sequence of SEQ ID NO:3, 6, 8, 11, 19, or 21, wherein said polypeptide has glyphosate resistance activity; wherein said nucleotide sequence is operably linked to a promoter that drives expression of a coding sequence in a plant cell.

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